

# THE DEVELOPMENT OF BUCKBOOST CONVERTER FOR DC MOTOR SPEED CONTROL

AHMAD EFENDI MOHAMAD

UNIVERSITI MALAYSIA PAHANG

# UNIVERSITI MALAYSIA PAHANG

## BORANG PENGESAHAN STATUS TESIS♦

JUDUL: **DEVELOPMENT OF BUCKBOOST CONVERTER FOR  
DC MOTOR CONTROL**

SESI PENGAJIAN: 2010/2011

Saya AHMAD EFENDI MOHAMAD ( 861016-46-5393 )  
(HURUF BESAR)

mengaku membenarkan tesis (Sarjana Muda/~~Sarjana~~ /~~Doktor Falsafah~~)\* ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Tesis adalah hakmilik Universiti Malaysia Pahang (UMP).
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. \*\*Sila tandakan ( √ )

☐

**SULIT**

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

☐

**TERHAD**

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

☒

**TIDAK TERHAD**

Disahkan oleh:

\_\_\_\_\_  
(TANDATANGAN PENULIS)

\_\_\_\_\_  
(TANDATANGAN PENYELIA)

Alamat Tetap:

**NO 89 KG PADANG KEMUNTING**  
**MARAS**  
**21020 K.TERENGGANU**  
**TERENGGANU**

**RAJA MOHD TAUFIKA B RAJA ISMAIL**  
( Nama Penyelia )

Tarikh: **29 NOVEMBER 2010**

Tarikh: : **29 NOVEMBER 2010**

- CATATAN:
- \* Potong yang tidak berkenaan.
  - \*\* Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali tempoh tesis ini perlu dikelaskan sebagai atau TERHAD.
  - ♦ Tesis dimaksudkan sebagai tesis bagi Ijazah doktor Falsafah dan Sarjana secara Penyelidikan, atau disertasi bagi pengajian secara kerja kursus dan penyelidikan, atau Laporan Projek Sarjana Muda (PSM).

“I hereby acknowledge that the scope and quality of this thesis is qualified for the  
award of the Bachelor Degree of Electrical Engineering (Power Systems)”

Signature : \_\_\_\_\_

Name : AHMAD EFENDI BIN MOHAMAD

Date : 29 NOVEMBER 2010

DEVELOPMENT OF BUCKBOOST CONVERTER FOR DC MOTOR SPEED  
CONTROL APPLICATION

AHMAD EFENDI MOHAMAD

A report submitted as partial fulfillment of the requirements for the award of the degree  
of Bachelor of Electrical Engineering (Power System)

Faculty of Electrical & Electronics Engineering  
Universiti Malaysia Pahang

NOVEMBER, 2010

“All the trademark and copyrights use herein are property of their respective owner. References of information from other sources are quoted accordingly; otherwise the information presented in this report is solely work of the author.”

Signature : \_\_\_\_\_

Author : AHMAD EFENDI MOHAMAD

Date : 29 NOVEMBER 2010

## TABLE OF CONTENT

CHAPTER	PAGE
TITLE	i
STATEMENT	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
ABSTRAK	v
TABLE OF CONTENTS	vi
LIST OF FIGURE	ix
LIST OF TABLE	x

CHAPTER	TITLE	PAGE
1	INTRODUCTION	
	1.1 Project Background	1
	1.2 Overview of project	1
	1.3 Project Objective	2
	1.4 Scope Of Project	3
	1.5 Problem Statment	3
	1.6 Thesis Outline	4

<b>CHAPTER</b>	<b>TITLE</b>	<b>PAGE</b>
<b>2</b>	<b>LITERATURE REVIEW</b>	
	<b>2.1 Introduction</b>	6
	<b>2.2 DC-DC Converter</b>	6
	2.2.1 Definition	6
		7
	<b>2.3 Switch-Mode Power Supply (SMPS)</b>	8
	<b>2.4 Pulse-Width Modulation (PWM)</b>	8
	<b>2.5 Programmer Integrated Circuit (PIC),18F4550</b>	
<b>3</b>	<b>METHODOLOGY</b>	
	3.1 Overview	10
	3.2 Hardware Development	10
	3.3 Buck-boost converter	11
	I. Power Mosfet (IRFP150N)	11
	II. Capacitor	12
	III. Inductor	12
	3.4 PIC 18F4550 Circuit Design	19
	3.5 Software Development	
	3.5.1 Proteus 7 Profesional	23
	3.6 List of Component	24
<b>4</b>	<b>RESULT AND DISCUSSION</b>	
	4.1 Introduction	25
	4.2 Software Implement	25
	4.2.1 MicroCode Studio Software	26
	4.3 Hardware Development	28
	<b>4.3.1 Expected Result</b>	29

<b>CHAPTER</b>	<b>TITLE</b>	<b>PAGE</b>
	4.3.2 Cooding	32
<b>5</b>	<b>CONCLUSION AND RECOMMENDATION</b>	
	5.1 Conclusion	35
	5.2 Recommendation	36
	<b>REFERENCES</b>	
	<b>APPENDIX</b>	



## LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
3.1	Simple Block Diagram	11
3.2	MOSFET (a) symbol and (b) characteristic)	12
3.3	Basic Buck-Boost Circuit	17
3.3 (a)	PSPICE simulation for $V_{in} = 17.4$ , $D = 0.408$	18
3.3 (b)	PSPICE simulation for $V_{in} = 10.0$ V; $D = 0.444$	18
3.3 (c)	PSPICE simulation for $V_{in} = 10.0$ V; $D = 0.545$	19
3.4	40-Pin PDIP Diagram of PIC 18F4455/18F4550	20
3.5	PIC 18F4550 power supply circuit	20
3.6	PIC 18F4550 clock circuit	21
3.7	PIC 18F4550 reset circuit	22
3.8	Proteus Virtual System Modeling (VSM)	23
4.1	The window of MicroCode Studio.	27
4.11	Overview by using Proteus software.	28
4.12	Complete Hardware is developed.	28
4.13	Pulse Width Modulation within 80% duty cycle	29
4.14	Pulse Width Modulation within 50% duty cycle	30
4.15	Pulse Width Modulation within 20% duty cycle	31
4.16	Pulse Width Modulation within 0% duty cycle	31

**LIST OF TABLE**

<b>FIGURE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
3.1	List of Component	24